Circuit II

DATE 25-02-2016

Summary:-

$q = CV \rightarrow$ Charge $\qquad i = C\frac{dV}{dt} \rightarrow$ currant

$$V = \frac{1}{C}\int_{t_0}^{t} i\,dt + V(t_0) \longrightarrow \text{Voltage}$$

$$P = Vi = CV\frac{dV}{dt} \rightarrow \text{power}$$

$$W = \frac{1}{2}CV^2 \rightarrow \text{Energy}$$

using Eq.

$$q = CV \Longrightarrow W = \frac{q^2}{2C} \rightarrow \text{Energy}$$

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[1] $C = 3\,mf \qquad q = 0.12 \qquad$ find voltage, energy

$$q = CV \Rightarrow V = \frac{q}{C} = \frac{0.12m}{3m} = 0.04\,V$$

$$W = \frac{1}{2}CV^2 = \frac{1}{2} \times (3 \times 10^{-3}) \times (0.04)^2 = 2.4 * 10^{-6}\,J$$

[2]

$V(t) = 50 \sin 2000t$ V

Determine the current through the capacitor

Sol.

$$i(t) = C\frac{dV}{dt} = 10 * 10^{-3}\frac{d}{dt}(50 \sin 2000t)$$

$$= 2000 \times 10 \times 10^{-3} * 50 \cos 2000t$$

$$= 1000 \cos 2000t \ A$$

[3]

$C = 100$ mf $\quad i(t) = 50 \sin 120\pi t$ mA

find voltage at $t = 1$ms and $t = 5$ms

take $V(0) = 0$

Sol.

$$V = \frac{1}{C}\int_{t_0}^{t} i\,dt + V(t_0)$$

$$= \frac{1}{100 \times 10^{-3}}\int_{0}^{t} 50 \sin 120\pi t\,dt \times 10^{-3}$$

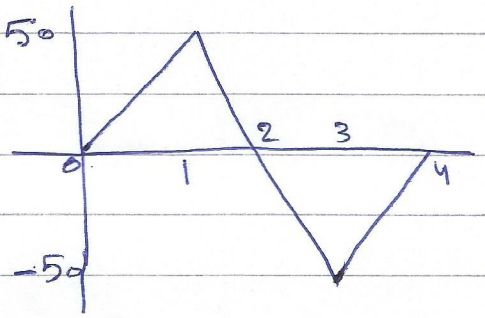
$$= \frac{50 \times 10^{-3}}{100 \times 10^{-3} \times 120\pi}\cos 120\pi t\Big|_{0}^{t}$$

at $t = 1$ms $\qquad$ at $t = 5$ms

$V = \ldots$ $\qquad$ $V = \ldots$

[4] نطاقة

$$v(t) = \begin{cases} 50t & 0<t<1 \\ 100-50t & 1<t<3 \\ -200+50t & 3<t<4 \\ 0 & otherwise \end{cases}$$



ثانية

نأخذ معادلة الخط اي مستقيم. $y = mt + c$

وتعوض بالنقطة الاولى

at $t=0$ $(0,0)$

$0 = m*0 + c$ $\boxed{c=0}$ → (1)

at $t=1$ $(1, 50)$

$50 = m + 0$

$\boxed{m=50}$ → (2)

$y = 50t + 0$

$y = 50t$

$v = 50t$

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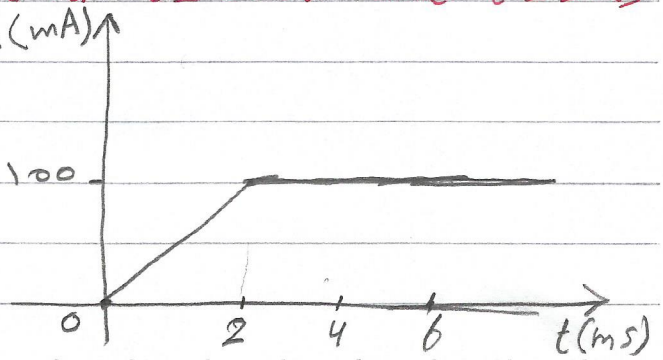
[4] سؤال

an initially uncharged 1mF capacitor has the current shown in fig calculate The voltage across it at $t=2ms$ and $t=5ms$



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